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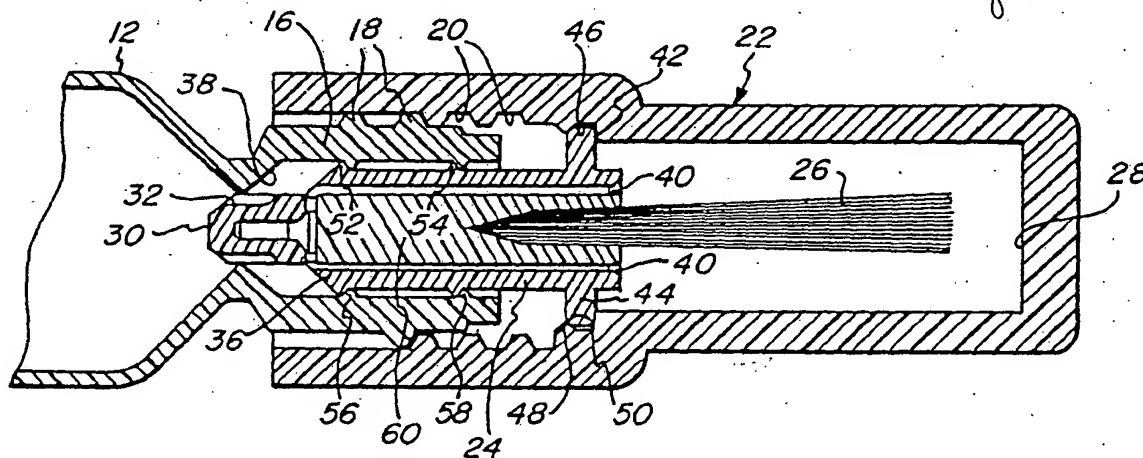
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(54) Title: FLUID DISPENSER AND APPLICATOR



(57) Abstract

A device for storing, dispensing and applying nail enamel and like fluids. A container (12) adapted to store the fluid is provided with a valve (24), the inner member (60) of which has an applicator (26) (e.g. bristles) mounted on its outer end. A closure cap (22) has an interior (28) adapted to receive the applicator (26) and serves to hold the valve (24) in the closed position, and to open the valve (24) as the cap (22) is removed. One or more channels (40) traverse the length of the valve stem (24). When the valve (24) is in the open position, fluid is made to flow through the channels (40) and on to the applicator (26) from which it can be transferred to fingernails and like substrate to be treated. Interacting stops (52, 54, 56, 58) on the valve stem (24) and housing (16) limit the distance which the valve stem (24) can travel when the closure cap (22) is removed. All component parts of the device are preferably fabricated from material which is, or has been treated to be, impermeable to the vapor of the fluid solvent thereby avoiding drying of fluid on the applicator during storage.

FLUID DISPENSER AND APPLICATOR

BACKGROUND OF THE INVENTION(1) Field of the Invention

This invention relates to fluid dispensers and applicators and is more particularly concerned with compact devices for storing and dispensing relatively volatile liquid compositions such as nail enamel and the like.

(2) Description of the Prior Art

Nail enamel dispensers hitherto available in the art have generally comprised a container for the enamel and a closure with attached applicator brush which latter is retained in the enamel when the dispenser is not in actual use. Similar devices have been employed for dispensing and applying other related fluids such as solvent adhesives, automotive touch-up paint and the like. Such dispensers exhibit a number of disadvantages. Thus contamination of the closure with fluid can give rise to difficulty in re-opening the container, particularly after prolonged storage. Further there is a potential for accidental spillage of fluid during actual use of the applicator brush. More particularly, the container, being open during application, allows volatiles to dissipate thereby gradually changing the composition of the container contents. In the case of nail enamels in particular

-2-

such a change can result in compositions which do not perform as desired, e.g., do not dry completely. Orifice reducers, applicator wipers and the like have been utilized to overcome this problem with only partial success.

Recently an improved nail enamel dispenser has been introduced which is constructed in a manner closely resembling a felt-tip pen. The device comprises a thin elongated fluid reservoir provided with a wick-type applicator and a closure cap. While the device represents a marked advance over the dispensers hitherto available, the wide applicator tends also to act as a filter and removes pigments and the like from enamels commonly employed in the art. Hence, special enamel formulations have to be devised for use in the newer dispenser. Further, the capacity of the reservoir is relatively low.

This invention is directed to an improved dispenser for nail enamel and like fluids which overcomes the various disadvantages of dispensers hitherto available.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a fluid dispenser and applicator wherein the applicator is integrally housed in the fluid container and a direct flow of fluid from the container to the applicator is controlled by valve means.

It is a further object of the invention to provide a fluid dispenser and applicator wherein residual fluid can remain on the applicator during storage without loss of solvent therefrom by evaporation or like means.

-3-

It is yet a further object of the invention to provide a fluid dispenser and applicator having means for uniformly mixing the fluid charge prior to dispensing.

5 A still further object of the invention is to provide a fluid dispenser and applicator device having closure means which, upon removal, serves to initiate flow of fluid to the applicator and, upon re-attachment to the device, interrupts said flow of fluid to the
10 applicator.

These objects, and other objects which will become apparent to one skilled in the art from the description which follows, are achieved by the fluid dispenser and applicator of the invention. The latter,
15 in its broadest aspect, comprises a container adapted to receive a charge of fluid and valve means associated therewith. The valve means comprises a housing and a stem slidably mounted therein, the stem having an applicator such as a pad or brush disposed on the end thereof which is remote from the interior of the
20 container. The valve stem has at least one channel traversing the body thereof and providing communication between the interior of the container and the applicator when the valve is in the open position. The container
25 is provided with a closure member which is adapted to enclose the applicator and associated valve stem. The closure member engages a flange on the valve stem and thereby holds the valve means in closed position when the closure member is affixed to the container. The
30 closure member also serves to enter into an annular bead interference with said flange and thus to open the valve during removal of said closure member from the container. Interacting stop means are provided on said valve stem and said housing to limit the distance

-4-

through which the said stem travels between the open and shut portions of the valve means.

In a particular embodiment of the device of the invention the valve housing is integrally formed in one end of said container. In a further embodiment of the device of the invention for containers having relatively wide necks, the valve housing is separately formed and is held in fluid tight engagement with the open end of the container by use of appropriate plug means.

In a preferred embodiment of the invention all parts of the device of the invention are fabricated from material which is impermeable to the vapor of the solvent present in the fluid charged to the container or which has been treated to render it impermeable to said vapor. The dispenser/applicators of the invention can be employed to handle a variety of fluid materials such as solvent-based adhesives, automotive touch-up paint, nail enamel and the like.

DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a cross-sectional view, taken along the longitudinal axis, of a device according to the invention in the valve closed position;

FIGURE 2 is a cross-sectional view showing the device illustrated in FIGURE 1 but in the valve open position;

FIGURE 2A is a cross-sectional view of the device illustrated in FIGURES 1 and 2 with the closure member separated from the container body;

FIGURE 3 is a plan view of the outer end of the valve stem assembly of the device illustrated in FIGURES 1, 2 and 3;

-5-

FIGURE 3A is a cross-sectional view, taken along line A-A, of the valve stem assembly shown in FIGURE 3;

FIGURE 3B is a cross-sectional view, taken along the line B-B, of the valve stem assembly shown in FIGURE 3;

FIGURE 4 is a cross-sectional view, taken along the longitudinal axis, of a modification of the device shown in FIGURE 1;

FIGURE 5 is a plan view of the outer end of a modification of the valve stem assembly shown in FIGURE 3;

FIGURE 6 is a cross-sectional view of an alternate embodiment of a valve assembly in accordance with the invention; and

FIGURE 7 is a plan view of the inner end of the valve assembly shown in FIGURE 6.

DETAILED DESCRIPTION OF THE INVENTION

The invention will now be illustrated by reference to the embodiments shown in the accompanying drawings.

FIG. 1 is a cross-sectional view, taken along the longitudinal axis of a dispenser/applicator shown generally as 10 in accordance with the invention. Cylindrical container 12 is provided with neck portion 14 on which is integrally formed valve housing 16. Screw threads 18 formed on the exterior surface of valve housing 16 interlock with corresponding female threads 20, on the interior of hollow closure member 22. Valve stem or body 24 has mounted therein by friction fit an inner member 60 which houses an applicator 26 in the

form of a brush. The latter projects into the interior
28 of the closure member 22. On its opposite end the
valve body 24 has an integrally formed cylindrical tip
30 provided with grooves 32 which traverse approximately
5 half the length of the said tip. The cylindrical tip 30
forms an interference fit with the opening 34 in the
narrowest portion of the neck 14. This interference fit
provides the initial valve seal in the configuration
shown in FIG. 1. In the valve open position shown in
10 FIG. 2 fluid flows from container 12 through channels
32.

The valve body 24, immediately adjacent the
junction with tip 30, has a bevelled edge 36 shown in
FIG. 2 which is adapted to engage correspondingly
15 configured seat 38 in the valve housing 16 in the valve
closed position shown in FIG. 1. A plurality of
channels 40 defined between the inner surface of the
valve body 24 and applicator housing 60 traverse the
length of valve body 24. The longitudinal axes of these
20 channels parallel that of the said valve body but are
each spaced therefrom at a distance greater than the
radius of the cylindrical tip 30. Thus, in the valve
closed position shown in FIG. 1 the inner ends of said
channels 40 are sealed by the seat 38 in valve housing
25 16 from communication with the interior of the container
12. In the valve open position shown in FIG. 2 the
channels 32 and 40 provide communication between the
interior of container 12 and the applicator 26.

In the valve closed position shown in FIG. 1
30 the bevelled edge 36 of valve body 24 is held in sealing
engagement with the seat 38 of valve housing 16 by the
clamping action of the base 42 of annular groove 46 in
closure member 22 on the edge of flange 44 on said valve

-7-

stem. The other wall of annular groove 46 forms bevelled annular projection 48. As the closure member 22 is unscrewed from the container 12 the said projection 48 engages the outer edge 50 of the underside of flange 44 on the valve body 24 and thereby acts to urge the valve into the valve open position shown in FIG. 2. The closure member 22 is fabricated from material such as resilient polymeric material so that, at the point at which the matching threads on the closure member 22 and the exterior of valve housing 16 become disengaged, the projection 48 on the interior of the said closure member will slide over the outer edge 50 on the underside of flange 44 to allow complete removal of the closure member from the container. The said outer edge 50 is preferably bevelled as illustrated in FIGS. 1 and 2 to facilitate the removal of the closure member in this manner. The dispenser applicator with closure member completely removed is illustrated in FIG. 2A.

The distance through which the valve body 24 can be moved during the removal of the closure member 22 is limited by interaction between annular projections 52 and 54 on the valve body 24 and corresponding annular projections 56 and 58 on the interior of valve housing 16.

Referring now to FIG. 3 there is shown in plan view the outer end (i.e. the end housing the applicator 26) of valve body 24 illustrated in FIGS. 1, 2 and 2A. In this particular embodiment the inner cylindrical member 60 housing the base of the applicator 26 is friction fitted into cavity 25 of square cross-section in valve body 24 the channels 40 being formed thereby as the passageways defined by the outer surface of the

-8-

cylindrical member 60 and the right angles of the square cross-section of cavity 25. FIGS. 3A and 3B which are cross-sectional views taken along the lines A-A and B-B respectively of FIG. 3 show two different views of the assembled valve body and applicator.

The particular embodiment of a valve stem illustrated in FIGS. 3, 3A and 3B represents a very convenient manner in which to fabricate the stem with traversing channels 40. It is to be understood, however, that other methods of fabrication can be employed without departing from the scope of the invention. Illustratively the valve body can be fabricated from a single block of material through which appropriate channels 40 are drilled.

The mode of operation of the dispenser/applicator of the invention will be readily apparent from a study of the above FIGS. 1, 2, 2A, 3, 3A and 3B. Fluid material such as nail enamel, is stored in container 12 and egress thereof from the container is prevented so long as the valve closed position shown in FIG. 1 is maintained. When the closure member 22 is unscrewed and removed, as illustrated in FIGS. 2 and 3, fluid can flow, or can be made to flow by providing container 12 with walls which can be flexed by application of manual pressure, through grooves 32 and thence through channels 40 to the applicator brush 26. The rate at which such flow takes place can be controlled to any desired degree by appropriate choice of dimensions of grooves 32 and/or channels 40. The fluid which is thus supplied to the applicator brush can then be transferred to the desired substrate, e.g., fingernails and/or toenails where the fluid is a nail enamel.

-9-

When the application procedure is completed the closure member 22 is secured in place and the fluid remaining in the container is thereby sealed from the access to the channels 40 by the action of the closure member 22 on the valve flange 44 which forces the bevelled end 36 of valve housing 16 into sealing engagement with the seat 38 of valve housing 16. Any fluid remaining on the applicator brush 26 after the closure member is re-applied is preserved in liquid form in the air-tight compartment 28 formed within the closure member 22. Advantageously and preferably the latter is fabricated from material which is impermeable to, or has been rendered impermeable to, the vapor of solvent employed in the fluid material charged to the container. A particularly preferred material from which to fabricate the closure member 22 where the device of the invention is to store and dispense nail enamel preparations is fluorinated polyethylene. This material is substantially impermeable to the vapor of the solvents commonly used in the formulation of nail enamels. The above material is also a preferred material for fabricating all the other components of the device of the invention since, in addition to solvent and solvent vapor impermeability, the material is also possessed of a desirable degree of resiliency.

FIG. 4 illustrates, in partial cross-section, a modified form of a dispenser/applicator in accordance with the invention. This modification permits the use of a container which has a wider mouth than that illustrated in the previous embodiment described and illustrated above. This is advantageous where it is desired to introduce means such as mixing balls into the fluid in the container in order that homogeneity of the

-10-

nail enamel and like compositions can be assured by vigorous shaking of the container prior to dispensing the contents thereof. In the embodiment shown in FIG. 4, in which the same numbering is retained for features illustrated in the previous embodiment, the container 12 is provided with a neck 62 having a mouth 64 of substantially wider diameter than that shown in FIGS. 1 and 2. The outer portion of the neck is provided on its exterior with screw threads 18' which interlock with matching female threads 20' on the interior of the closure member 22'. Hollow plug 66 is retained in place in the mouth 64 of the container 12 by means of flange 72 and undercut-annular groove 70 which receives annular projection 68 disposed on the inner lip of the container mouth 64. The plug 66 is provided with an inwardly projecting frustoconical section 74 which allows for lead-in alignment during capping on high speed filling lines. Plug 66 serves as the valve housing which receives the valve body shown as 24'. The inner surface 38' of the projection 74 forms the valve seat which enters into sealing engagement with the bevelled surface 36' on the valve body 24'. The mode of construction of the valve body 24' and attached applicator 26' corresponds to that shown in FIGS. 1 and 2 and will not be elaborated further. Similarly the mode of opening and closing the valve of the modification of FIG. 4 by unscrewing, removing, and replacing the closure member 22' corresponds precisely to that shown and described in relation to FIGS. 1 and 2 and will not be elaborated further.

An alternative mode of construction of the valve housing and valve body with applicator incorporated shown in FIG. 4 is illustrated in

-11-

cross-section in FIG. 6. In the latter embodiment applicator 26" is mounted in housing 60' which is friction fitted sealingly into cavity 78 in valve body 24". Housing 60' is provided with channel 80 which traverses the length of said housing with applicator 26" mounted in the flared outer end of said channel. The inner end of channel 80 is aligned with narrow end of frustoconical channel 82 in the inner end of valve body 24". In the closed position of the valve assembly channel 82 is in sealing engagement with mating plug 84. The latter is held in place in the center of end 88 of plug 66' by means of spokes 86 as shown in FIG. 7 which is a plan view of end 88. In the open configuration of the valve assembly shown in FIGS. 6 and 7 fluid passes from the container (not shown) via channels 82 and 80 to the inner end of applicator 26".

In the particular embodiment of the valve stem illustrated in FIGS. 1 and 2 and more particularly in FIG. 3, four channels 40 are provided and are disposed substantially symmetrically about the longitudinal axis of the valve stem. In such an embodiment the fluid reaching the applicator 26 in the valve open mode is distributed substantially evenly over the applicator. It is often desirable in practice, however, to distribute the fluid over a part only of the surface of the applicator to minimize potential drippage of the fluid from the applicator during transfer to the substrate to be coated. Such a partial distribution can be achieved by providing channels with exits in locations confined to one predetermined area of the base of the applicator 26. Such a modification is illustrated in FIG. 5 which is a plan view, corresponding to that shown in FIG. 3, of a modified

-12-

form of valve stem. In this modification the core 60' has a modified cross-section which leaves only two channels 40" between the core and the walls of cavity 25' in valve body 24'. The two channels are disposed asymmetrically with respect to the axis of the valve stem and serves to deliver fluid to only the upper surfaces of applicator 26'. In such a modification it is desirable to indicate to the user of the container in some appropriate manner, e.g., by appropriate marking on the exterior of the container, the particular configuration in which the device should be held during use in order to permit the fluid to be dispensed onto most appropriate area of the applicator.

The dispenser/applicator of the invention has been illustrated above by reference to certain specific embodiments thereof. It is to be understood that these embodiments are merely illustrative and non-limiting. Various modifications thereof, which will be obvious to those skilled in the art, can be made without departing from the scope of the present invention. Illustratively, the applicator 26 which is shown above as taking the form of a brush could also take the form of a pad of felt or other material. Similarly the container 12 could assume other shapes such as sphere or a tube of square, rectangular or elliptical cross-section. Other such modifications will be readily apparent to one skilled in this particular art.

-13-

What is claimed is:

1. A fluid dispenser and applicator comprising, in combination:

a container adapted to receive a charge of fluid;

5 valve means associated with said container and comprising a housing and a stem slidably mounted in said housing;

applicator means disposed on the outer end of said stem;

10 at least one channel traversing the body of said stem and adapted to deliver fluid from said container to said applicator when said valve is in the open position;

a closure member for said container adapted to
15 enclose said valve stem and attached applicator means;

flange means on said stem adapted to engage said closure member whereby said valve means is held in closed position when said closure member is secured in place and is opened when said closure member is removed;
20 and

interacting stop means on said stem and said housing to limit the distance travelled by said stem.

2. A fluid dispenser and applicator according to Claim 1 wherein said valve housing is integrally formed in one end of said container.

3. A fluid dispenser and applicator according to Claim 1 wherein said valve housing is separately formed and held in fluid tight engagement with the open end of said container.

-14-

4. A fluid dispenser and applicator according to Claim 4 wherein said closure member is a screw-on cap.

5. A fluid dispenser and applicator according to Claim 1 wherein said closure member engages said container in fluid and vapor tight sealing relationship when secured in place.

6. A fluid dispenser and applicator according to Claim 1 wherein said applicator is formed of bristles.

7. A fluid dispenser and applicator according to Claim 1 wherein said closure member is fabricated from material impermeable to the vapor of the solvent employed in said fluid change.

8. A fluid dispenser and applicator according to Claim 1 wherein said container is charged with nail enamel.

9. A nail enamel dispenser comprising in combination:

a hollow container adapted to receive a charge of nail enamel;

5 valve means disposed in the mouth of said container;

said valve means comprising a housing and a stem slidably mounted in said housing;

10 said stem being provided, at the end remote from the interior of said container, with enamel applicator means;

at least one channel traversing said stem and adapted to deliver enamel from said container to said applicator in the open position of said valve means;

-15-

15 a closure member adapted to hold said valve means in the closed position when said member is secured on said container and to open said valve means when said closure member is removed;

20 stop means associated with said valve stem and said valve housing which permits said stem to travel a limited distance, after removal of said closure means, from a position in which communication is established between the interior of said container and said at least
25 one channel in said stem.

10. A nail enamel dispenser according to Claim 9 wherein said enamel applicator is fabricated from bristles.

11. A nail enamel dispenser according to Claim 9 wherein said valve housing is integrally formed in the mouth of said container.

12. A nail enamel dispenser according to Claim 9 wherein said valve housing is separate from said container and is held in sealing engagement with the mouth thereof.

13. A nail enamel dispenser according to Claim 9 wherein said closure member is fabricated from material impermeable to enamel solvent vapor.

14. A nail enamel dispenser according to Claim 9 wherein there are a plurality of channels traversing said stem and having their longitudinal axes in parallel relationship to that of said stem.

-16-

15. A nail enamel dispenser according to Claim 9 wherein there are two channels traversing said stem, each of said channels being asymmetrically disposed in said stem with their longitudinal axes parallel to that of said stem.

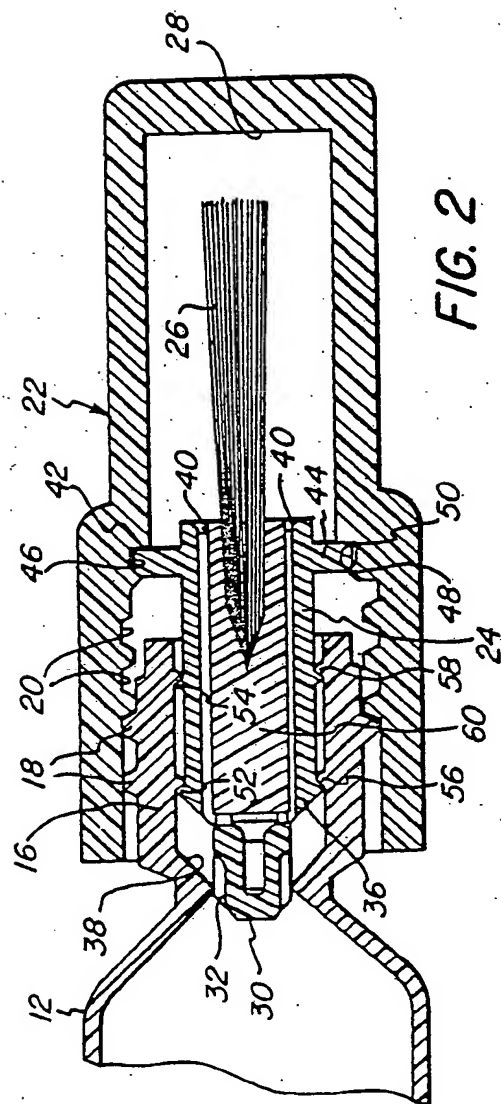
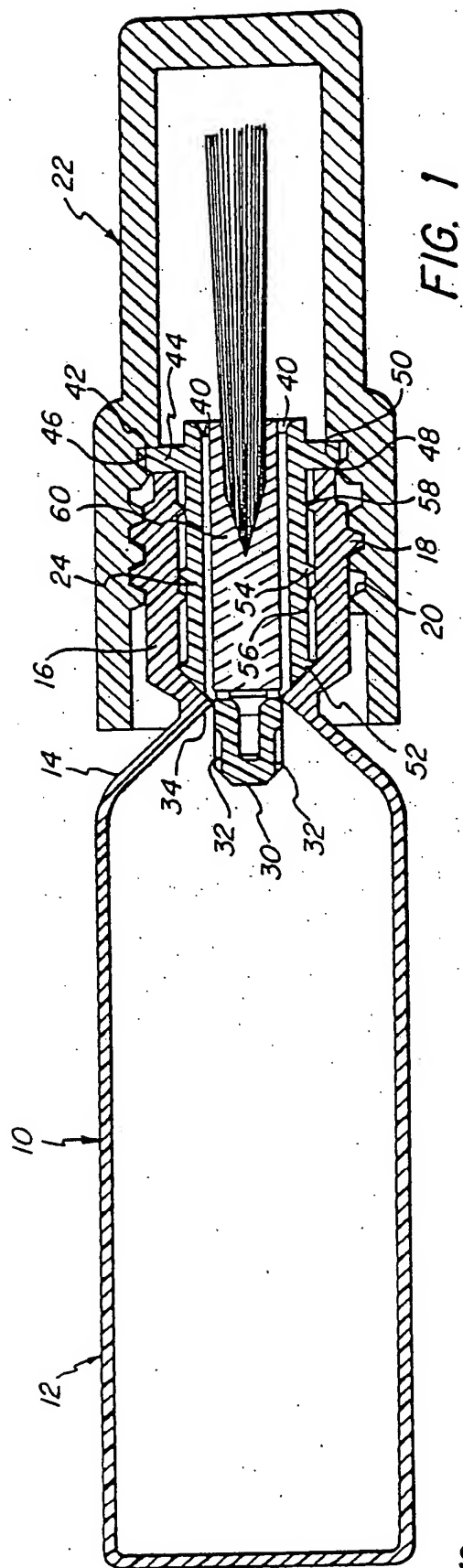
16. A nail enamel dispenser according to Claim 9 wherein said channel traverses the longitudinal axis of said stem and delivers enamel to the inner end of the said applicator in the open position of said valve means.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US87/02564

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ¹		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC (4): A46B 11/00, B67D 5/06		
U.S. Cl. 401/269, 222/182		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁴		
Classification System ¹	Classification Symbols	
U.S.	401/268, 269, 270, 272, 280, 281 222/153, 182, 212, 520, 524; 215/311	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁴		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹¹		
Category ⁹	Citation of Document, ¹² with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
X Y	US, A, 3,400,997 (SCHWARTZMAN) 10 September 1968, see the entire document.	1, 3-10, 12-15 2, 11, 16
Y	US, A, 3,157,323 (KITTERMAN) 17 November 1964, see Figures 2, 3, and column 2, line 70 to column 3, line 2.	2, 11
Y	US, A, 2,945,252 (MARTINEAU, JR.) 19 July 1960, see Figure 4, and column 2, lines 41-44.	16
A	US, A, 1,092,656 (LYNAM) 07 April 1914, See Figures 1, and 2.	1, 9
A	US, A, 4,007,857 (TOMIATI ET AL) 15 February 1977, see Figures, and column 6, lines 1-16.	1-16
<p>¹³ Special categories of cited documents: ¹³</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Δ" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search ²	Date of Mailing of this International Search Report ³	
30 November 1987	14 JAN 1988	
International Searching Authority ¹	Signature of Authorized Officer ¹⁰	
ISA/US	D. Bender <i>D. Bender</i>	



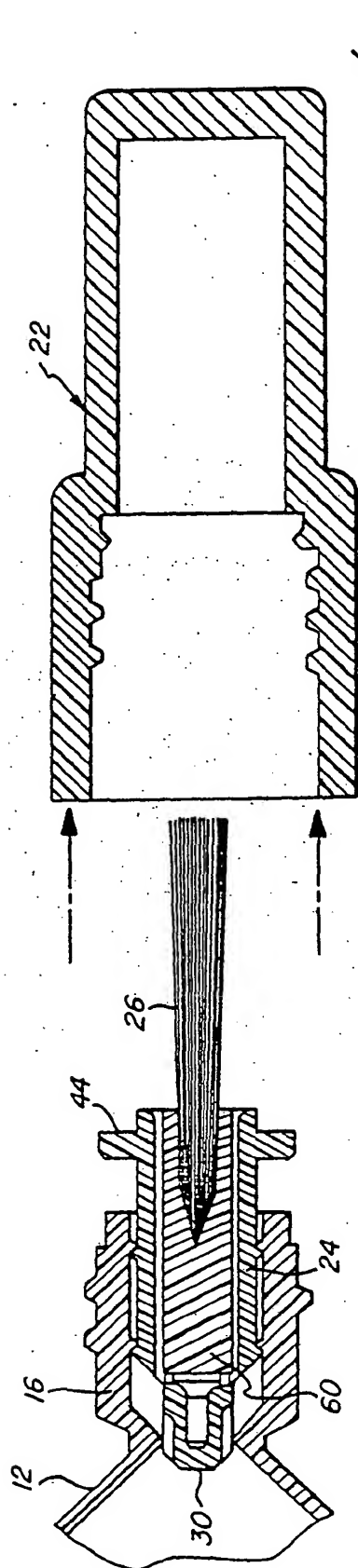


FIG. 2A

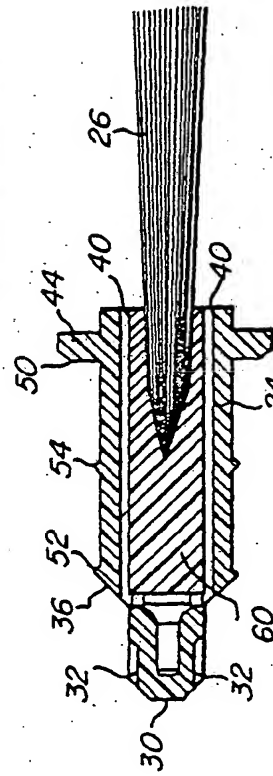


FIG. 3A

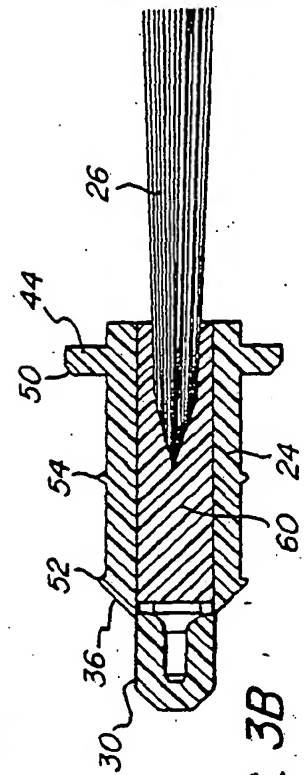


FIG. 3B

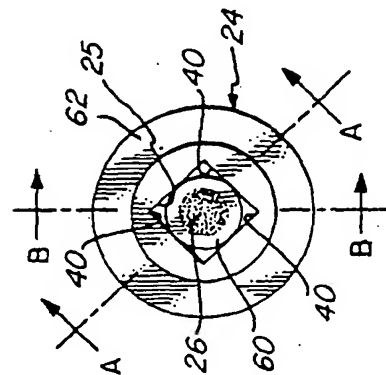


FIG. 3

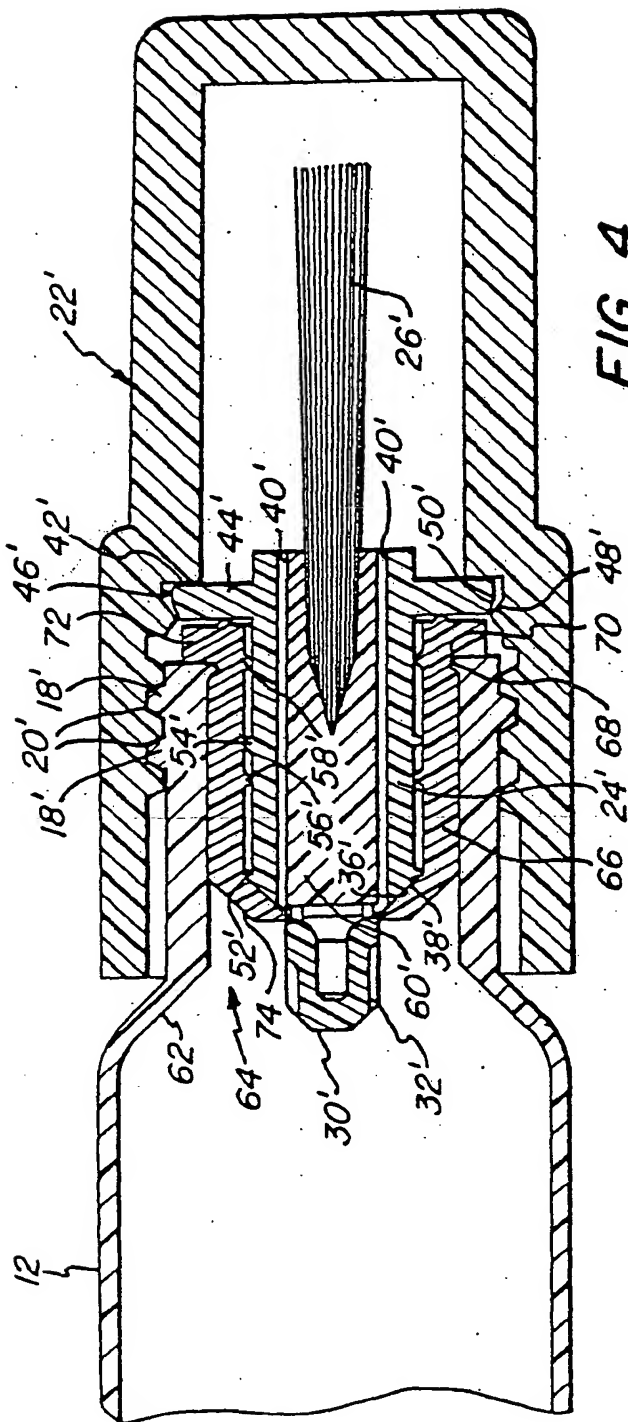


FIG. 4

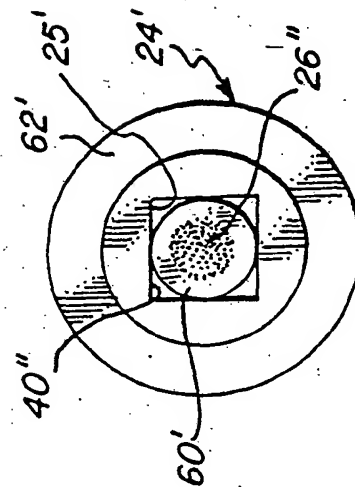


FIG. 5

